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VERNAL MIGRATION OF BALD EAGLES FROM A SOUTHERN COLORADO WINTERING AREA

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Abstract.—Adult Bald Eagles (*Haliaeetus leucocephalus*) ($N = 15$) wintering in the San Luis Valley (SLV), Colorado were radio-tagged with conventional tail-mounted transmitters between 1 January–18 March 1980 and 1981 to determine migration patterns and breeding areas. Migrating eagles were followed primarily in a single vehicle with two trackers. In 1980, radio-tagged eagles ($N = 4$) left the wintering grounds within a 15-d span in March but departures in 1981 ($N = 7$) ranged from mid-February to early April. Eagles initiated migration on days with higher temperature ranges, more clouds, and higher winds than other days during winter or spring. Subsequent travel paralleled the northward movement of the 2°C isotherm both temporally and spatially. Locations and pathways of migrating eagles were similar in both 1980 and 1981. All four eagles located on their summer range were within 102 km of each other in northeastern Saskatchewan and northwestern Manitoba. Mean distance from the SLV wintering area to breeding or summer areas of Bald Eagles was 2019 km. Adult Bald Eagles apparently migrated alone in spring with mated males leaving first. Migration flights began between 1015–1045 H MST and ended between 1715–1745 H. Mean daily movement was 180 km. Migration flight speeds averaged about 50 km/hr. Altitude of flight ranged from 30–4572 m above ground level (AGL), but most often was between 1500–3050 m.

Key Words: *Bald Eagle;* Haliaeetus leucocephalus; *Colorado; radio-tracking; Saskatchewan; vernal migration; wintering.*

MIGRACIÓN PRIMAVERAL DE LAS ÁGUILAS CALVAS DESDE UN ÁREA DE INVERNACIÓN AL SUR DE COLORADO

Resumen.—Individuos adultos de águila calva (*Haliaeetus leucocephalus*) ($N = 15$) invernando en el valle de San Luis (VSL) Colorado, fueron provistos con radios transmisores convencionales montados en la cola, entre el 1 de enero–18 de marzo de 1980 y 1981 para determinar los patrones de migración y las áreas de reproducción. Las águilas en migración fueron seguidas en primera instancia en un vehículo sencillo con dos rastreadores. En 1980, las águilas con radios ($N = 4$) abandonaron los campos de invernación en un intervalo de 15 días en marzo, pero las partidas en 1981 ($N = 7$) fueron entre mediados de febrero y principios de abril. Las águilas iniciaron la migración en días con rangos de temperaturas mas altos, mas nubes, y vientos mas altos que otros días durante el invierno o primavera. El subsiguiente vuelo fue paralelo al movimiento hacia el norte de la isoterma 2°C tanto temporal como espacialmente. Las localizaciones y vías de paso de las águilas migratorias fueron similares en 1980 y 1981. Las cuatro águilas localizadas en su rango de verano estuvieron dentro de 102 km una de otra en el nororiente de Saskatchewan y noroccidente de Manitoba. La distancia media desde el área de invernación del VSL a las áreas de reproducción o de verano de las águilas calvas fue de 2019 km. Las águilas calvas adultas aparentemente migraron solas en primavera mientras que sus machos pareja salieron primero. Los vuelos de migración comenzaron entre 1015–1045 H MST y terminaron entre 1715–1745 H. El movimiento medio diario fue 180 km. Las velocidades de los vuelos durante la migración tuvieron un promedio de 50 km/h. La altitud de vuelo tuvo un rango entre 30–4572 m.s.n.m. pero la mayoría a menudo estuvo entre 1500–3050 m.

[Traducción de César Márquez]

Relatively stable wintering populations of Bald Eagles (*Haliaeetus leucocephalus*) existed in the San Luis Valley (SLV) of southern Colorado throughout the DDT era (Ryder 1965, Alamosa National Wildlife Refuge reports 1954–83). In the 1970s, a mean of 185 (SD = 66.6) Bald Eagles was counted in the SLV annually ($N = 5$; Craig 1981). However, origins of eagles wintering in the SLV were unknown.

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Between December–April 1977 and 1978, wintering Bald Eagles (N = 36) in the SLV were marked with yellow patagial wing markers to determine their geographic origins or breeding areas (Harmata and Stahlecker 1993). Colormarking revealed fidelity of individual Bald Eagles to this wintering area was high, but by January 1981 only three sightings of yellow-marked eagles occurred outside the SLV and none were in a documented nesting area or during summer (Harmata and Stahlecker 1993). The primary objective of the marking program had not been realized. Clearly, other methods were required to achieve objectives in a timely and cost-efficient manner.

Prior to the 1980s, technology for remotely tracking long-range movements of individual birds (i.e., satellite platform transmitter terminals or PTTs) was not available. However, on 28 February 1978, after being tracked locally for nearly six weeks, an adult Bald Eagle wearing a conventional, tail-mounted transmitter left her SLV wintering area. She was tracked for two days over 300 km through the most rugged portion of the Rocky Mountains, being lost only due to lack of logistical planning, not our ability to maintain contact. This serendipitous event revealed the potential of determining migration routes and breeding areas of Bald Eagles using conventional radio-tracking. This paper discusses results of subsequent long-range tracking of Bald Eagles with conventional telemetry from one seasonal range to another prior to widespread use of PTTs on eagles (e.g., Grubb et al. 1994, Brodeur et al. 1996, Meyburg et al. 2001).

Objectives of this study were: (1) to determine breeding areas of adult Bald Eagles wintering in southern Colorado and (2) to gather information regarding factors associated with initiation of vernal migration, routes, duration, stopover habitats used, and other factors affecting the successful completion of migration.

STUDY AREA AND METHODS

The SLV is the largest and most southern of four large intermountain basins in Colorado. Encompassing 6475 km^2, the SLV is approximately the size of the state of Delaware. Mean elevation of the nearly-level valley floor is 2286 masl. High (>3050 m) mountain ranges border the valley on east and west, merging at the northern end. The Rio Grande and Conejos rivers flow through the SLV and numerous natural warm springs and wetlands that seldom freeze have made the SLV attractive to waterfowl and Bald Eagles, probably for millennia. Water developments and agriculture in the 20th century have probably improved the attractiveness.

Between 7 January–18 March 1980 and 1981, 15 adult Bald Eagles were captured and radio-tagged in the SLV All were captured by a modified "Lockhart" method (Miner 1975) with and without live Bald Eagle and Golden Eagle (*Aquila chrysaetos*) lure birds. Trap sites were chosen on the basis of frequency and duration of the presence of two adult Bald Eagles of distinctly dissimilar size, presumably mated, within 1.6 km. In 1981, I estimated the SLV winter population at 170 Bald Eagles (Harmata 1984).

Gender of radio-tagged eagles was assigned by methods presented by Garcelon et al. (1985). Three were confirmed by behavior during copulation. All Bald Eagles were radio-tagged with two-stage radio transmitters mounted proximo-ventrally on the tail. Transmitter frequencies were between 148.500 and 148.950 mHz. Unit life expectancy was ≥5 mo. Transmitter, antenna, and mounting tab weighed 50–57 g. Telemetry receiving equipment included fixed channel and programmable receivers.

Mated status of radio-tagged Bald Eagles was determined by frequency and duration of time spent in the presence of another adult eagle of distinctly dissimilar size, observed copulation (N = 3) in the SLV, or association with a nest site on the breeding grounds (N = 2). Eagles were considered unmated if diurnal movements in the SLV were clearly independent of other eagles and they were not observed to roost away from communal roosts with just one other eagle, as mated birds often did

Climatological data associated with days that Bald Eagles left the SLV were analyzed by stepwise discriminate analysis (Dixon 1981) to investigate meteorological conditions associated with initiation of vernal migration. Climatological data recorded near the geographical center of the SLV (Alamosa, Colorado) were obtained from National Oceanographic and Atmospheric Administration, Asheville, North Carolina Monthly Summary Sheets. Data for days that eagles left the SLV were compared to data for days randomly selected between 1 January–15 April 1980 and 1981 that they did not. Variables selected for comparisons among days were maximum, mean, and range of temperature, percent of clear sky and mean wind speed.

Migrating eagles were followed primarily from a single 4 × 4 vehicle with two human trackers and a dog. An omnidirectional antenna and two element "H" yagi receiving antenna were mounted on the roof of the chase vehicle. The yagi was attached to a 360° traversing mount, allowing for directional tracking while the vehicle was moving. Manpower and logistic limitations plus variability in departure dates, routes, and travel speeds of Bald Eagles prevented ground tracking of more than one eagle at a time. One tracker drove while the other operated the receiving equipment. Both shared navigational duties. Due to often high chase speeds (up to 150 km/hr) and off-road "adventures," visual contact with migrating eagles could not be maintained, so migration behavior often could not be recorded continuously, accurately, or safely. Route, direction, and speed of the chase vehicle, therefore, often was selected primarily to maintain maximum audio signal strength. When contact with a migrating eagle was lost, an aerial search was implemented using local air services. A two or three element yagi an-

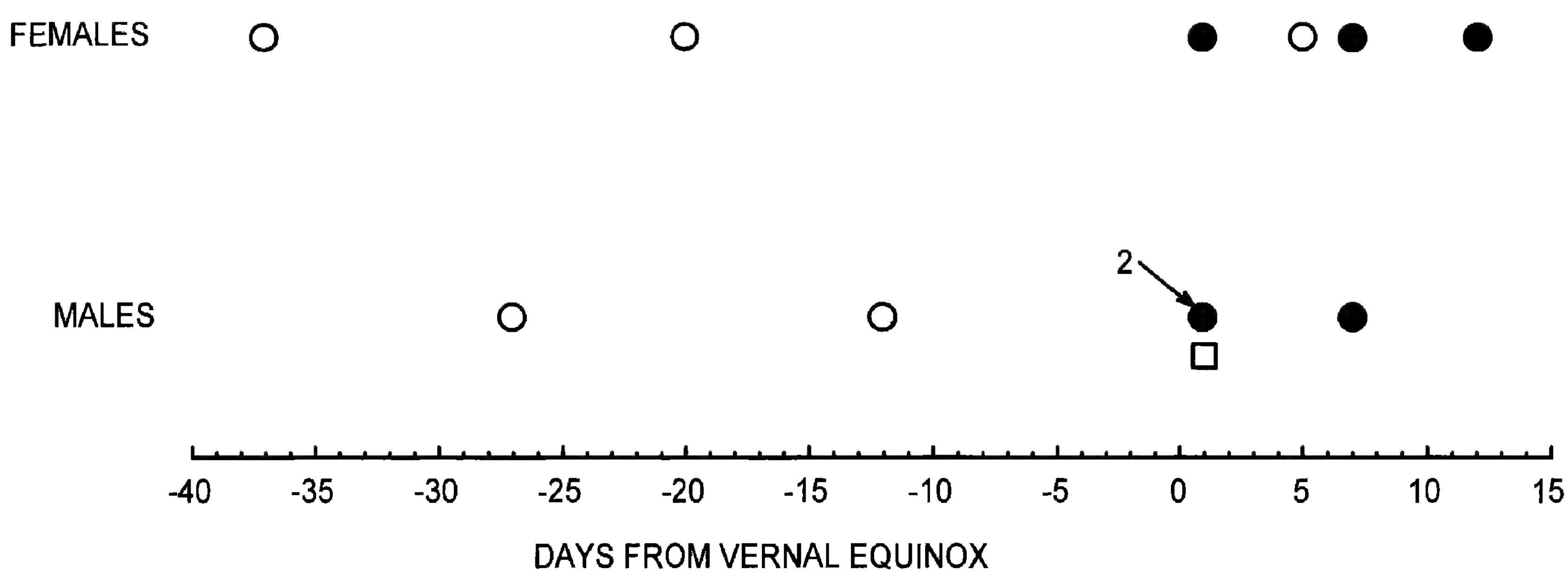

Figure 1. Days from vernal equinox that radio-tagged Bald Eagles departed ($N = 12$) their San Luis Valley, Colorado, winter ranges to initiate vernal migration, 1978 ($N = 1$), 1980 ($N = 4$), 1981 ($N = 7$). Open circles indicate eagles determined to be unmated, closed circles indicate eagles that were mated (see text), and square indicates eagle of undetermined mated status.

tenna was taped to the wing strut (high wing) or step (low wing) of light aircraft and the area surveyed in transect style with intermittent, "lazy" circles at high altitude. Frequencies were scanned to search for the target eagle and other potential migrating birds. When contact was reestablished and eagle's status discerned as stationary, vehicle tracking resumed. Flight altitudes were estimated based on eagle's position relative to the search aircraft and trees, geography, and structures such as buildings and radio towers while ground tracking. Eagles were monitored in their summering grounds with Beaver aircraft, snow machines, and snow shoes.

RESULTS AND DISCUSSION

Initiation of Migration. Over half (58%) of radio-tagged Bald Eagles with known departure dates ($N = 12$), initiated vernal migration within one week after the vernal equinox (Fig. 1). In 1980, radio-tagged eagles ($N = 4$) all left the wintering grounds within a 15-d span in March (Table 1). Range of known departure dates ($N = 8$) spanned 50 d in 1981, with the first confirmed departure of

Table 1. Residency and mated status of radio-tagged adult Bald Eagles with known departure dates from winter ranges in the San Luis Valley (SLV), Colorado.

EAGLE DESIGNATION	SEX	DATE: CAPTURED	DATE: DEPARTED SLV	MATED STATUS[a]	MINIMUM RESIDENCY IN SLV (DAYS)
378	F	21 Jan. 1978	28 Feb. 1978	U	39
180	F	18 Jan. 1980	21 Mar. 1980	M	63
280	M	23 Jan. 1980	24 Mar. 1980[b]	M	61
380	M	23 Jan. 1980	21 Mar. 1980	M	58
480	M	27 Jan. 1980	8 Mar. 1980	U	41
181	F	7 Jan. 1981	11 Feb. 1981	U	36
281	M	9 Jan. 1981	20 Feb. 1981	U	43
381	F	9 Jan. 1981	27 Mar. 1981	M	78
481	M	11 Jan. 1981	27 Mar. 1981	M	76
581	F	15 Jan. 1981	25 Mar. 1981	U	70
881	M	15 Mar. 1981	21 Mar. 1981	?[c]	7
981	F	18 Mar. 1981	1 Apr. 1981	M	15

[a] M = mated, U = unmated (see text).
[b] First departed on 22 March 1980, but eagle encountered a winter storm and returned to winter range.
[c] Undetermined.

Table 2. Mean climatological values (±99% confidence interval) which discriminated ($P \leq 0.01$) between days radio-tagged Bald Eagles initiated northward migration from their San Luis Valley, Colorado wintering area (Depart) and days they did not (Remain).

	TEMPERATURE RANGE (°C)	PERCENT SKY CLEAR	WIND SPEED (km/hr)
Depart ($N = 11$)	24 (5)	50 (26)	22 (5)
Remain ($N = 21$)[a]	19 (4)	56 (20)	16 (5)

[a] Randomly selected.

a radio-tagged eagle occurring in mid-February and the last in early April (Table 1). Number of days from the equinox that eagles departed was not different between genders (Mann-Whitney U = 16.50, P = 0.81). However, mated eagles departed the SLV closer to the equinox and later than unmated eagles (Mann-Whitney U = 3.00, P = 0.03; Fig. 1).

Three climatological variables discriminated between days that radio-tagged Bald Eagles left the SLV on migration and those they did not (Table 2). Eagles initiated migration on days with much larger range of temperatures, more clouds, and with higher winds than other days over the winter-spring period. Migration tended to be initiated about 5 hr after sunrise regardless of the immediate meteorological condition.

Photoperiodism is considered to be the ultimate stimulus for the onset of migration in birds (King and Farner 1963). All radio-tagged Bald Eagles determined to be mated left the SLV within 12 days of the vernal equinox, indicating breeding adults may be sensitive to equal periods of light and dark. Unmated, nonbreeding, or immature eagles may be equally sensitive but may not be driven by pressure to procreate. In fact, first observations of subadult eagles in northern ranges both years were not until at least two weeks subsequent to the arrival of the first radio-tagged adults. Migrational movement also paralleled the northward movement of the 2°C isotherm (Lincoln 1979) both temporally and spatially, hinting that thermal cues may also be involved in the initiation of migration. Once the urge is kindled, proximate affectors of Bald Eagle migration appear to be coincident with incoming low pressure systems, associated wide range of temperatures, cyclonic air flows, and southerly winds; similar to conditions noted by Bagg et al. (1950) for other birds.

Although Bald Eagles are apparently sensitive to local conditions when migration is initiated, they appear to be cognizant of little beyond their immediate environs. Eagle 280 departed the SLV on 22 March 1980 and traveled 145 km north before being stopped by severe snow squalls. He spent the night on a mountain pass and as the storm persisted to the north the next day, he returned to his winter range in the valley. He spent the remainder of that day and part of the next in close association with a female (distinctly larger eagle) and was observed to copulate during this period. He initiated migration again on 24 March, leaving the SLV for the season.

Migration Routes, Destination, and Navigation. In 1980, a relatively narrow migration corridor through Colorado, Wyoming, and Montana was used by three radio-tagged eagles (Fig. 2). Eagle 380 became sedentary in north-central Saskatchewan after 15 d of migration, six of which were spent sitting out bad weather. After four days of almost continual solitary soaring, he was found perched close to a larger eagle where he remained for several hours. The next day the pair began construction of a new nest on Chachukew Lake, north of Pelican Narrows, Saskatchewan. They eventually fledged one young in August 1980.

In 1981, eagle 281 left the SLV on 20 February, and was followed for two days over 302 km through the mountains of western Colorado (Fig. 3). Direction was primarily northwest and 281 was the only eagle tracked that crossed the Continental Divide. Subsequent tracking of 281 was interrupted because a radio of the same frequency and pulse rate as 281 was tracked for a day before I discovered it was a transmitter on a collar of a bighorn sheep (*Ovis canadensis*).

Eagle 981 left the SLV on 1 April and was followed to about 65 km north of Casper, Wyoming, where she was lost in a snow storm because roads became impassable. Eagle 481 was detected approaching Fort Peck Reservoir in east-central Montana on 5 April. After leaving Fort Peck Reservoir, 481 flew due north about 35 km then gradually shifted to a northwest course. This route took him directly to the Missouri Coteau, a ridge line running longitudinally for over 150 km in southwestern Saskatchewan. He continued north along the Coteau for about 100 km. Approaching the Canadian Shield, 481 made a sudden change in course

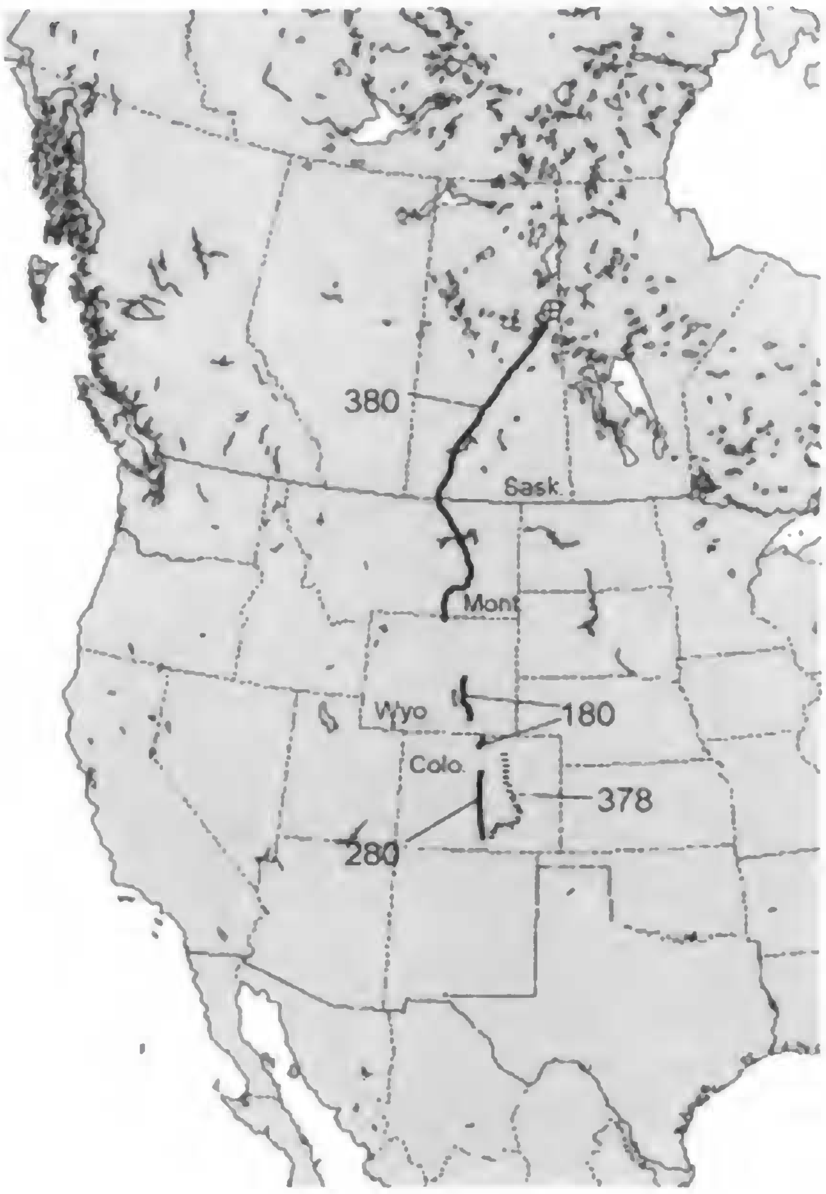

Figure 2. Partial migration routes of radio-tagged adult Bald Eagles from winter ranges in the San Luis Valley, Colorado in 1978 and 1980. Numbers indicate eagle designation and year (Table 1). Summering area of eagle 380 is indicated by ⊕ (confirmed nest location).

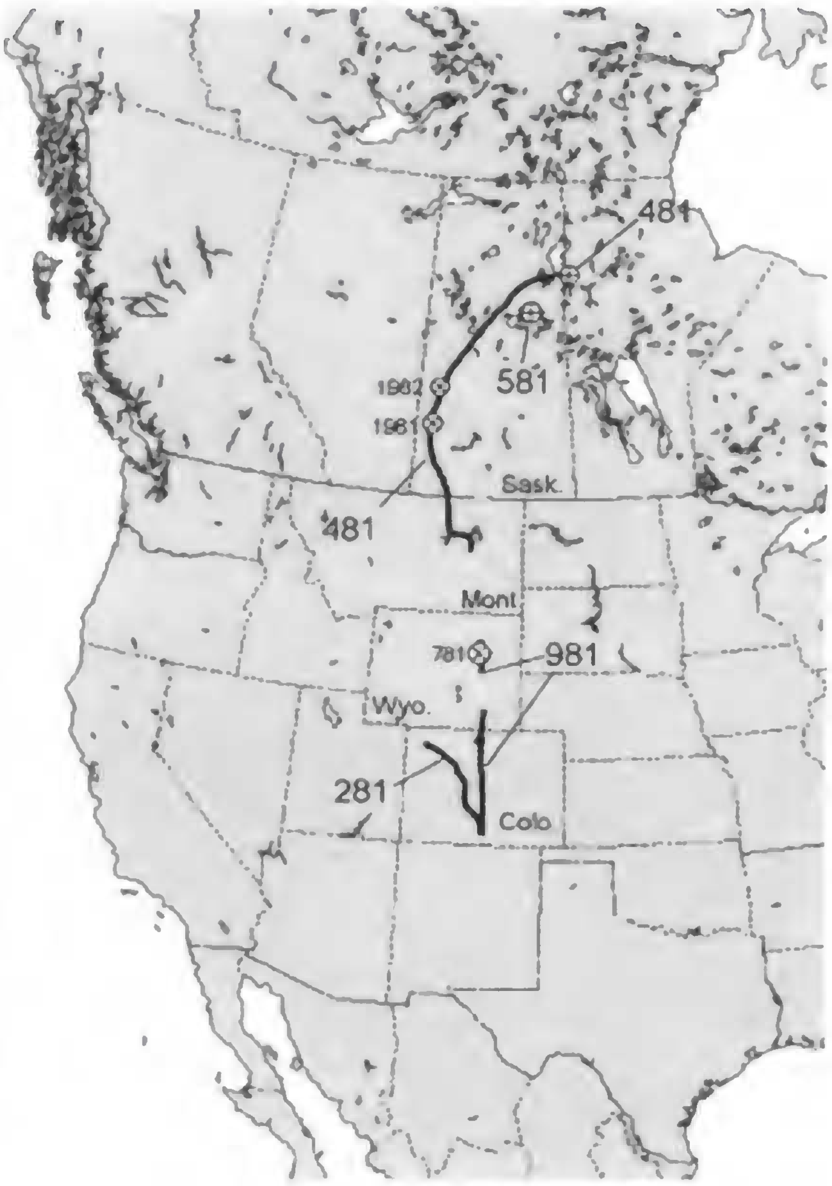

Figure 3. Partial migration routes of radio-tagged adult Bald Eagles from winter ranges in the San Luis Valley (SLV), Colorado in 1981. Numbers indicate eagle designation (Table 1). Summering areas are indicated by ⊕ (nest locations). Respective 1981 and 1982 recovery locations of Bald Eagles banded in the SLV (January 1977) are indicated by ⊗. The October 1981 recovery location of a Bald Eagle radio-tagged in the SLV in March 1981 is indicated by 781.

from north to northeast, paralleling the direction of many elongated lakes and rivers in the Canadian Shield country. Eagle 481 was subsequently followed to Reindeer Lake, Saskatchewan, arriving on 10 April. On 22 April, 481 was found by air associated with a nest site on Kamuchawie Lake in western Manitoba near the Saskatchewan border (Fig. 3).

Aerial surveys covering ca. 210 000 km^2 of northern Saskatchewan were conducted to detect signals of other SLV Bald Eagles in mid- to late April in both 1980 and 1981. During aerial surveys, eagle 181 was located on the Pagato River, south of Reindeer Lake, Saskatchewan, and eagle 581 was detected briefly in the area of Trade Lake, south of the Churchill River (Fig. 3). The signal was weak and intermittent, which indicated either a radio malfunction, a dead eagle, or a bird in incubation posture. Lack of contact with other SLV eagles may have been a function of transmitter failure (one was known to fail in the SLV), premature shedding of the transmitter (one transmitter was found still attached to broken tail feathers below a perch tree in the SLV), mortality, incomplete survey coverage, or summering areas were located outside of northern Saskatchewan. However, the fact that 31% of potentially-detectable eagles ($N = 13$) were located within an area roughly the size of Yellowstone National Park (ca. 9300 km^2) suggests that most adult Bald Eagles wintering in the SLV originated from this area of Canada.

Mean distance (as the eagle flies) from the SLV wintering area to breeding or summer areas of Bald Eagles was 2019 km (N = 4, SD = 50). All eagles located on their summer ranges were within 102 km of each other in northeastern Saskatchewan or northwestern Manitoba (Figs. 2 and 3). Duration of travel between winter and summer range for SLV Bald Eagles with known departure and arrival dates (N = 2) was 15 d. Although SLV Bald Eagles traveled about ⅔ the distance to their summer ranges compared to one Bald Eagle tracked by satellite from Arizona to the Northwest Territories (3032 km, Grubb et al. 1994), they completed the journey in only about 40% of the time. However, the Arizona eagle was a subadult (3rd yr) and presumably was not driven by the impetus to nest, as were adult SLV eagles tracked.

Geography, celestial cues, and weather may all play a role during migration of Bald Eagles. Prominent physiographic features such as deep canyons, rivers, and north-south oriented topography seemed to assist in visual navigation during flight (Griffin 1943). These features could have been imprinted in the memory of eagles during their initial migrations and experience dictated direction during subsequent flights (kinesis theory; Matthews 1963). Imprinting of migration routes from wintering areas, which compliment survival during the first year, would be more adaptive than imprinting during first southward migration.

Eagles did not migrate on days of total overcast, a phenomenon also noted by Gerrard and Gerrard (1982). The altitude of the cloud layer may have an effect, but overcast layers over 90 m were not experienced during tracking. Sun compass orientation (Kramer 1952, 1957) with time compensation, commonly referred to as sun-azimuth orientation (Welty 1982) may, therefore, be important for orientation of adult Bald Eagles during migration.

True navigation (selection of a compass direction toward a known goal in unfamiliar territory; Able 1980) may also be a component of Bald Eagle migration. Migrating eagles appear to avoid strong winds during migration because strong winds apparently influence direction of flight. Eagles did not move, except locally, during days when winds in excess of 35 km/hr occurred prior to 0900 H. East winds of 60–80 km/hr began about two hours after initiation of eagle 380's flight on one migration day and his flight path deviated well west of direct line to the eventual goal. Flight direction for the remainder of migration clearly compensated for the one day blown off course (Fig. 2). Unless the eagle had been exposed to the area on previous migrations, true navigation is indicated. However, it is not unreasonable to assume that an adult eagle over five years old, may indeed be familiar with a great portion of western North America as a result of vagaries of previous migrations. Regardless, redundancy in navigational systems has been illustrated for homing pigeons (*Columba livia*) (Able 1980) and in all probability, several backup navigational systems are available to Bald Eagles, especially experienced adults.

Migration Behavior. Mated adult Bald Eagles apparently migrated alone in the spring. Eagle 380 was seen roosting solitarily at all but one stopover location (six other eagles on the Yellowstone River near Hysham, Montana). Eagle 481 did not migrate with a mate, but often moved northward with other adult eagles. He roosted with other eagles three times, but two sites obviously were not communal or traditional because of lack of similarity to typical Bald Eagle roost sites (Kiester and Anthony 1983). Paired roosting was probably a result of facilitatory behavior influenced by poor weather and lack of daylight remaining. Subsequent observations of migration flight confirmed he moved alone. Once in the boreal forest of the Canadian Shield country, local eagles appeared to "meet" him in flight and escort him through their territories, but no overt agonistic encounters were observed. Occasional associations with other eagles appeared incidental for all radio-tagged eagles and were of short duration. Solitary migration behavior in established pairs would reduce the possibility of both members being lost in a local catastrophe.

Daily migration flights consistently began between 1015–1045 H MST and ended between 1715–1745 H. Mean daily movement was 180 km, but ranged from 144–435 km (N = 5) in 1980 and 33–248 km (N = 5) in 1981. Speed of migration flights recorded averaged 50 km/hr (N = 7, 22–144 km/hr in 1980; N = 9, 20–105 km/hr in 1981). Altitude of flights recorded ranged from 30–4572 m AGL, but most often was between 1500–3050 m.

Total distances, speed, and daily duration of migratory flights indicate that under optimal weather conditions, Bald Eagles can reach their breeding grounds within 6 d after leaving the SLV. Pennycuick (1975) indicated a 2000 km migration for a bird the size of a Bald Eagle would be near maximum attainable without eating, assuming a 25%

mass loss. During this study, no radio-tagged eagles were observed feeding during migration and mean migration distance was 2020 km. Captive eagles commonly fast more than two weeks with no apparent deleterious effects (Brown and Amadon 1968, pers. observ.) and wild raptors can lose up to 30% of body mass without problems (Newton 1979). These compensatory capacities undoubtedly allowed adult Bald Eagles to reach their breeding grounds with sufficient energy reserve for breeding.

All radio-tagged eagles arrived in their summer range at a time when lakes and most stretches of rivers were still frozen. The only areas of open water were rapids or narrows on rivers or between lakes. Radio-tagged eagles spent most of their time there, presumably foraging for fish. Other eagles observed during aerial surveys were associated with ubiquitous holes in lake ice and viscera piles of fish left by native commercial fishing operations. Foraging eagles were also seen on or near caribou (*Rangifer tarandus*) and moose (*Alces alces*) carcasses killed by natives or wolves (*Canis lupus*). A few eagles were seen with snowshoe hare (*Lepus americanus*) remains.

Regional Relationships. McClelland et al. (1994) noted that Bald Eagles radio-tagged in Glacier National Park, Montana, in autumn wintered west of the Continental Divide and summered in the MacKenzie River watershed of northern Alberta, northwest Saskatchewan, and Northwest Territories. The summer range of a Bald Eagle that wintered in Arizona (west of the Divide) also was in the MacKenzie River watershed (Grubb et al. 1994). McClelland et al. (1994) suggested that wintering areas may be related to the watershed of origin and Bald Eagles be managed by application of a "Migration Flyway Concept." Adult Bald Eagles radio-tagged and banded in the SLV wintering area (east of the Divide) were tracked to breeding areas in Saskatchewan and Manitoba, all in the Churchill River watershed. Jenkins et al. (1982) followed two adult Bald Eagles radio-tagged in Wyoming during winter. One trapped on the west side of the Continental Divide was followed to the MacKenzie River watershed, while one trapped on the east side of the Divide was followed to the Churchill River watershed, similar to those from the SLV. These data suggest a "Churchill–East Slope" Migration Flyway exists, distinct from the "Mackenzie–Intermountain" Flyway proposed by McClelland et al. (1994).

Stopover areas used during vernal migration of SLV Bald Eagles were generally widely distributed. A tree of adequate size, secure from human disturbance in any type habitat, was all that seemed necessary for roosting. In late March 1982, Swenson (1983) counted 232 Bald Eagles along the Yellowstone River between the mouth of the Bighorn River and Miles City, Montana. A site where eagle 380 roosted is in the middle of this stretch and within an area where the river seldom freezes, contained the most highly braided portion of channel, most heavily wooded islands, and highest Canada goose (*Branta canadensis*) populations of three sections of river studied by Hinz (1974). Use of this section of the Yellowstone River by adults may be dictated primarily by tradition and availability of water, because migrating adults were not known to feed during this study.

Areas in eastern Montana may be equally important to as many or more migrating eagles as the more highly-publicized areas, where ephemeral concentrations of eagles occur in western Montana. Leighton et al. (1979) estimated a population of 14 000 Bald Eagles in Saskatchewan. Some eagles from north-central Saskatchewan were captured in autumn at Hauser Lake (Restani et al. 2000) and Glacier National Park (McClelland et al. 1982), while others passed through eastern Montana during migration (Gerrard et al. 1978, Harmata et al. 1985). Both Hauser Lake and Glacier National Park Bald Eagle concentrations are now defunct due to a collapsed, exotic food base (kokanee salmon, *Oncorhynchus nerka*), but eastern Montana habitats still support large numbers of native prey (lagomorphs, ungulates, waterfowl). However, lack of a concentrated food base, diffusion of roost sites, solitary habits of migrating eagles, plus dispersion of departure dates from winter (this study) and summer ranges (Harmata et al. 1985), prohibit any accurate estimate of numbers of Bald Eagles passing through eastern Montana. Relatively low numbers of eagles present at any particular time at some stopover areas in eastern Montana may belie the true importance of these areas to migrating eagles. Turnover of individuals appeared to be daily, over months. Therefore, western prairie states may provide important migratory habitat for a large proportion of the continental population of Bald Eagles over long periods.

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